

## **1.1 Radio Astronomy**

### **1.1.1 Maintenance and Calibration**

- MarkIV VLBI recorders maintenance: performed successful recording tests after scheduled commercial power tests.
- Performed a calibration run in Q-band with DSS-54 antenna (Advanced Tracking and Observational Techniques -ATOT-, 480min), using the Antenna Calibration and Measurement Equipment -ACME- to measure the Q-band efficiency (sensitivity measured is about 0.13 K/Jy in the continuum). The system has not yet achieved full sensitivity because the Q-band post-amplifiers provided are insufficient to overcome the loss of the long hard-lines between the first and second stage down-converters.
- Configured and connected the IF Matrix Switch (6x24) to be able inject signal from K-band (DSS-63) or Q-band (DSS-54) into the SPB500 spectrometer, the MarkIV data acquisition terminal, the Wide Band VLBI radio Science Receivers (WVSR), and ACME.
- Checked MarkIV DAT video converters performance for spectroscopy observations. Found that their performance is better if the input signal level is configured about 10dBm higher than usual. Host Country astronomers have been advised to use VC11 instead of VC04.
- RAC60A HP workstation impacted during scheduled commercial power tests performed during week 30. It was repaired at CMF. It was found a faulty connection from the power button to the power supply.
- Fixed several bugs at exp\_control software used to control spectroscopy observations at Q-band (DSS-54).
- Improved the “init” and “testing” Field System scripts to check if the source command properly reaches the EAC software, during VLBI pre-experiment configurations.
- Modified RAC60A and RAC60 s/w to use the new TAMS gateway to control the GPIB bus at the Research & Development rack.

### **1.1.2 Research and Development**

CGM attended the ASTRID Management Committee meeting on July 1<sup>st</sup> at Universidad Complutense de Madrid.

Q-band first science light was obtained on July 15th with spectra of methanol -44 GHz- and CS -49 GHz- (ATOT, 480min). First test spectrum of SiO was obtained on July 11th.

Imparted a first training course on Q-band Operations to the Host Country radio astronomers from LAEFF (INTA).

### 1.1.3 Observations

#### 1.1.3.1 Host Country Spectroscopy

During this month spectroscopy observations with DSS-63 antenna were carried out using the SPB500 spectrometer and the MarkIV data acquisition terminal. Following Host Country projects were performed using DSS-63 antenna:

- **D63-S01:** study of CCS molecule (22.334 GHz) extended emission in young low-mass proto-stars. The CCS molecule is abundant in molecular clouds during the first stages of star formation. We plan to make maps of its emission in several star-forming regions, to study their physical conditions and chemical processes in the cloud.
- **D63-S02:** search for water maser emission toward optically obscured planetary nebulae. This project will allow testing the prediction that the precursors of planetary nebulae (PNe) might be optically obscured post-AGB stars with water fountains.

DOY	minutes scheduled	minutes used	Percent good data	Activity	comments
185	310	0	0	"GBRA Host Country D63-S02"	DSS63RED(DR#M104958) comm. problems
198	495	200	30	"GBRA Host Country D63-S01"	
210	435	435	70	"GBRA Host Country D63-S02"	

#### 1.1.3.2 Interferometry

MDSCC participated in 3 Very Long Baseline Interferometric (VLBI) observations (1920 min in total):

- RFC Clock Synchronization on DSS-65 (2 observations; 480 min): 100% data collected; performance of the system nominal.
- RFC Catalog M&E on DSS-65 (1 observation; 1440 min): antenna stopped in AZ in several occasions (DR#M104939), 5 sources were impacted (1.5% data lost).